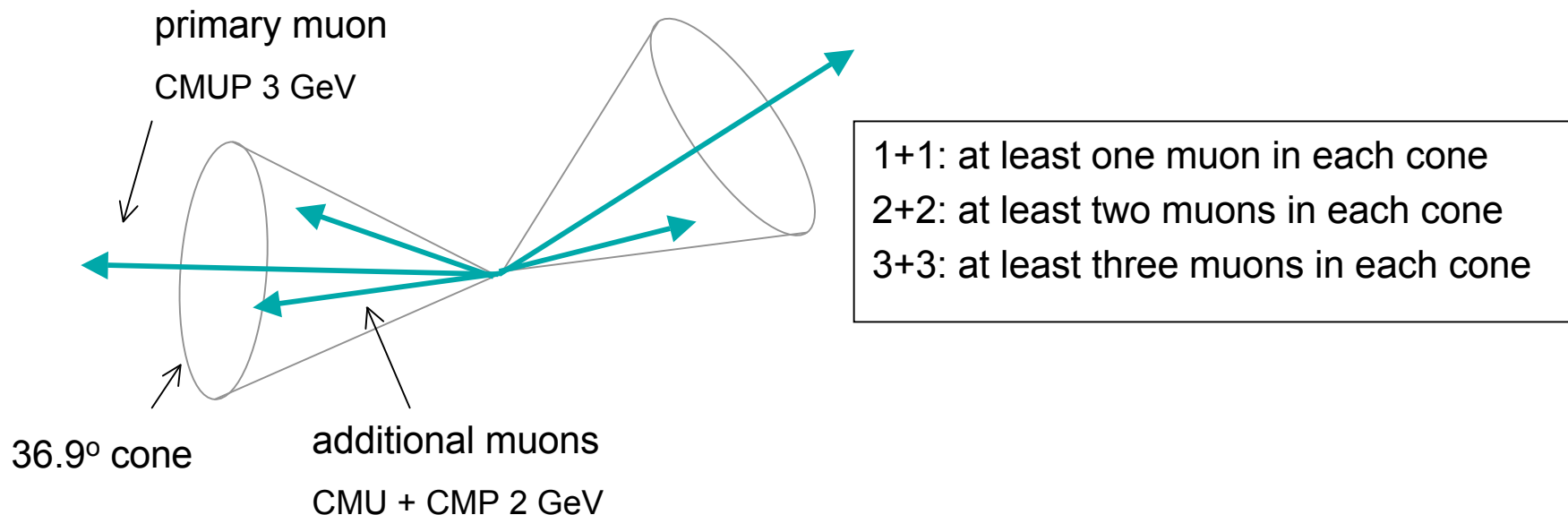
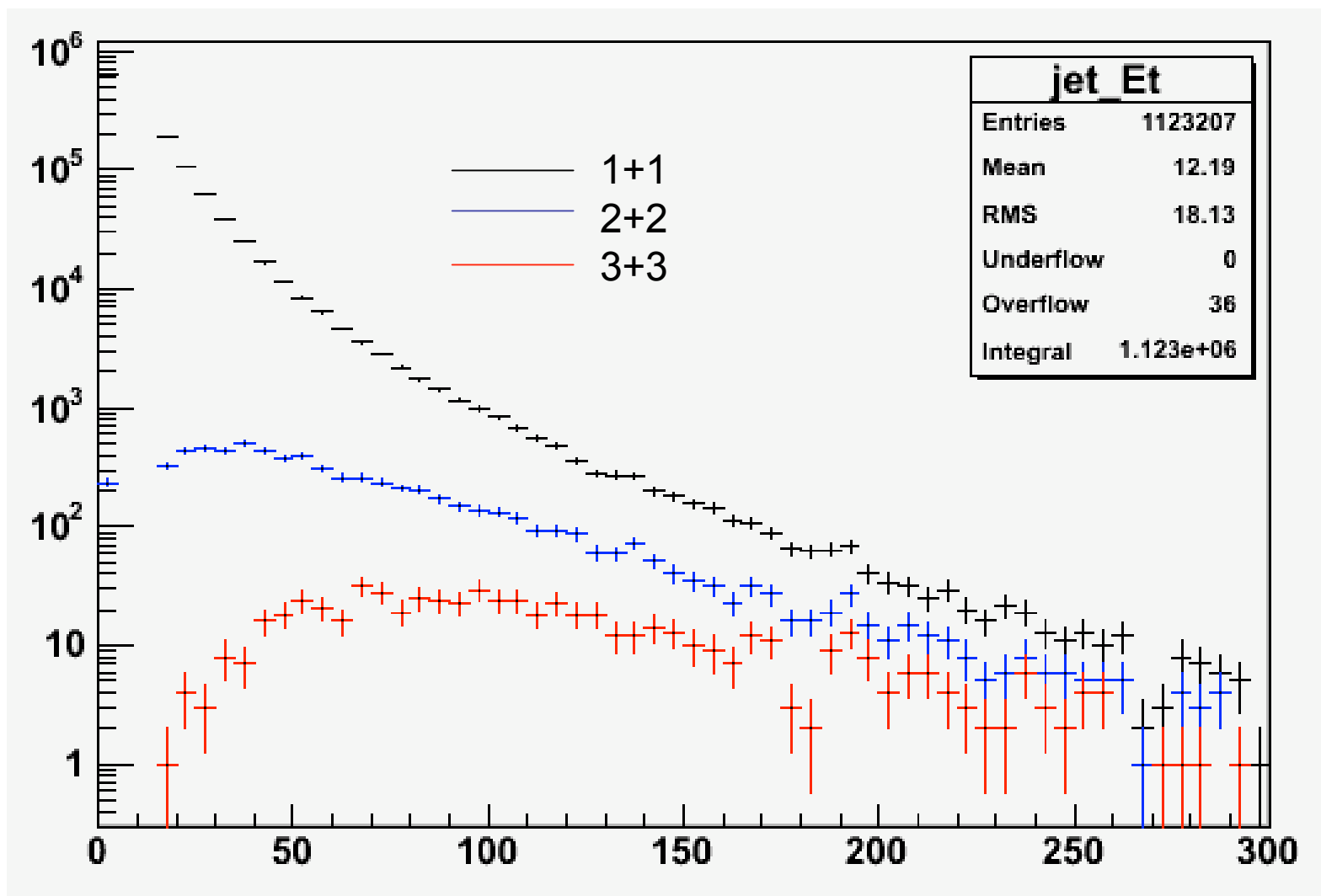


Jets in multiple muon events

- No calorimeter info in BStntuple
- Event displays of multi-muon events show large energy deposit in calorimeters
- Look for jets in di-muon sample using Stntuples
- Divide sample according to different muon multiplicities in cones
- Plot maximum jet Et in each event



Jet Et for different muon multiplicities



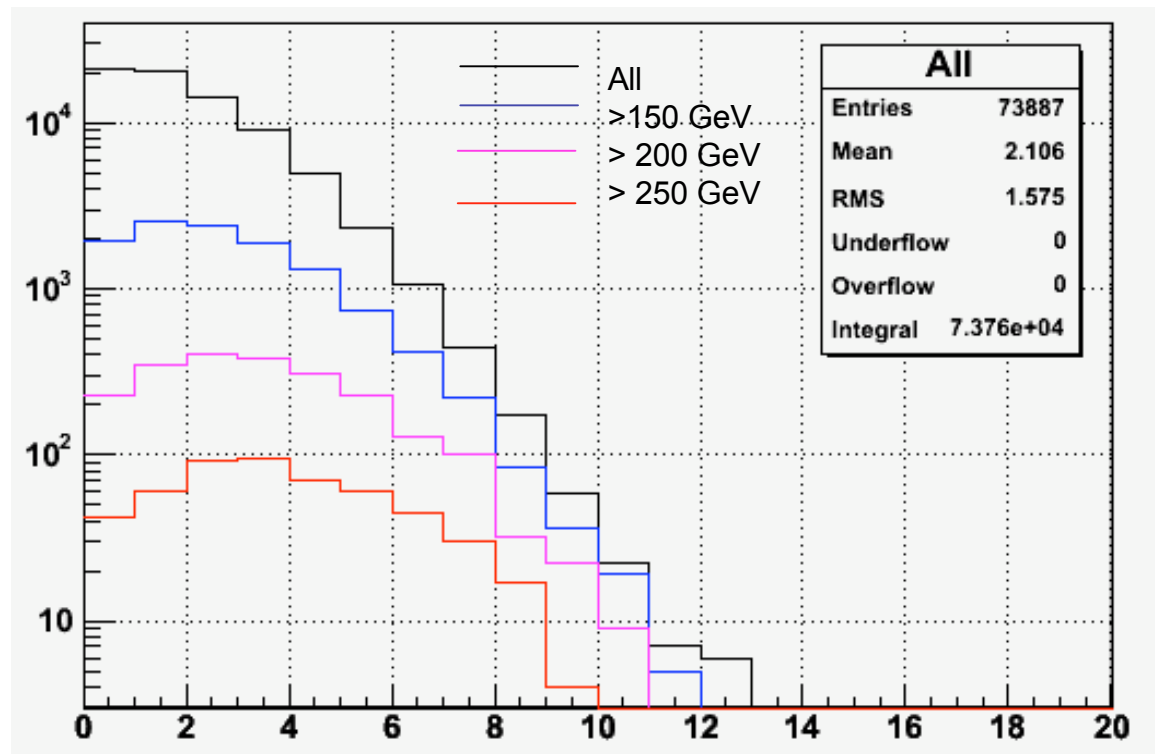
Jets in multiple muon events

- Et spectrum is very different for different muon multiplicity
 - 1+1 $\langle Et \rangle = 12.2$ GeV
 - 2+2 $\langle Et \rangle = 63.8$ GeV
 - 3+3 $\langle Et \rangle = 112.1$ GeV
- around ~ 250 GeV and above the majority of events have multiple muons
- look at muon multiplicity in generic high Et jet data

Jet100: total mu multiplicity distribution CMU+CMP

$|\eta| < 0.5$, NTracks > 3

- Count number of CMU + CMP muons in each event
- Cut on max Et jet



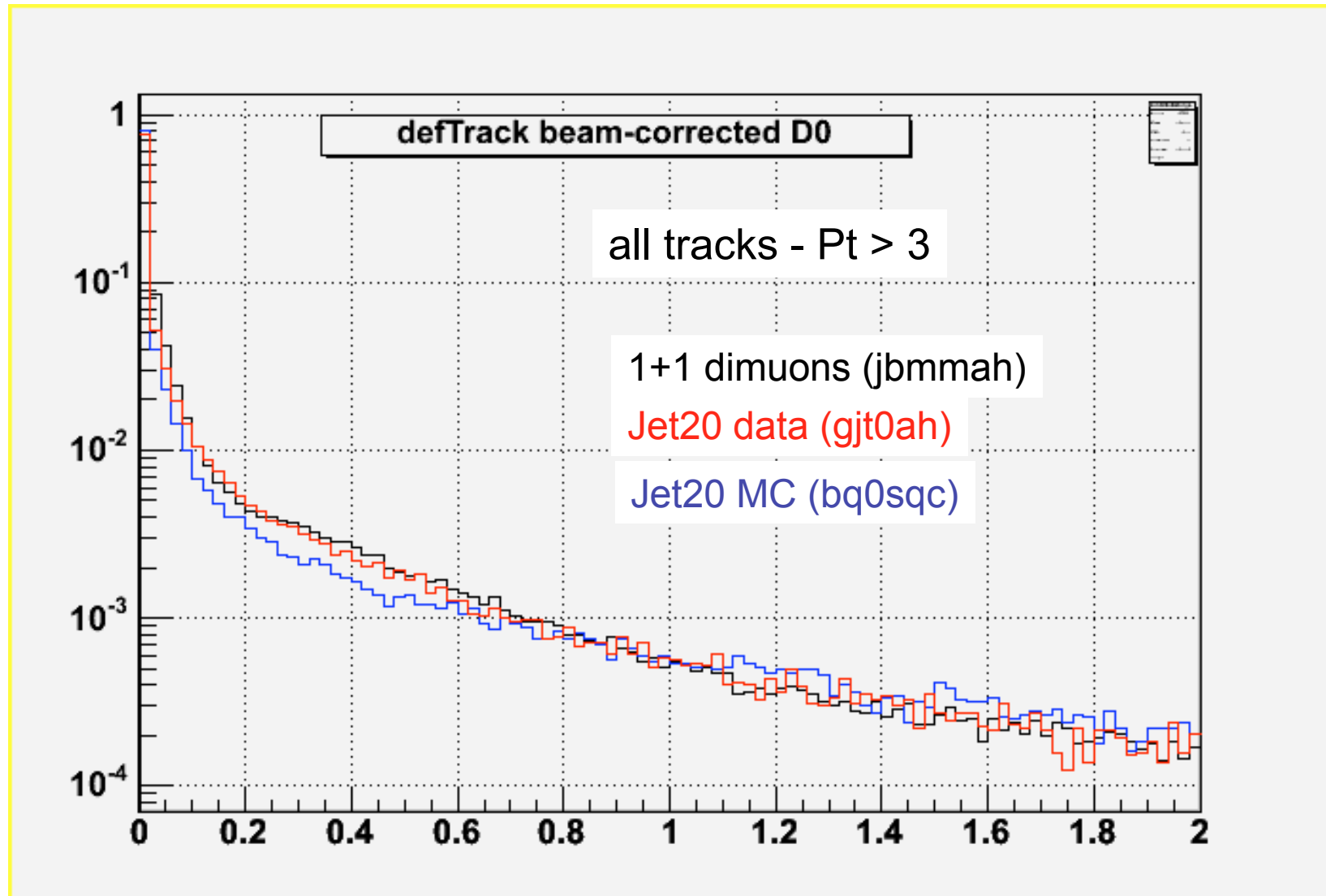
Jets in multiple muon events

- multiple muons are found in the majority of high Et jet events
- correct fake estimate is crucial to detect possible muon excess with respect to known physics
- complicated by possible fake probability correlation due to jet punch through into muon detectors

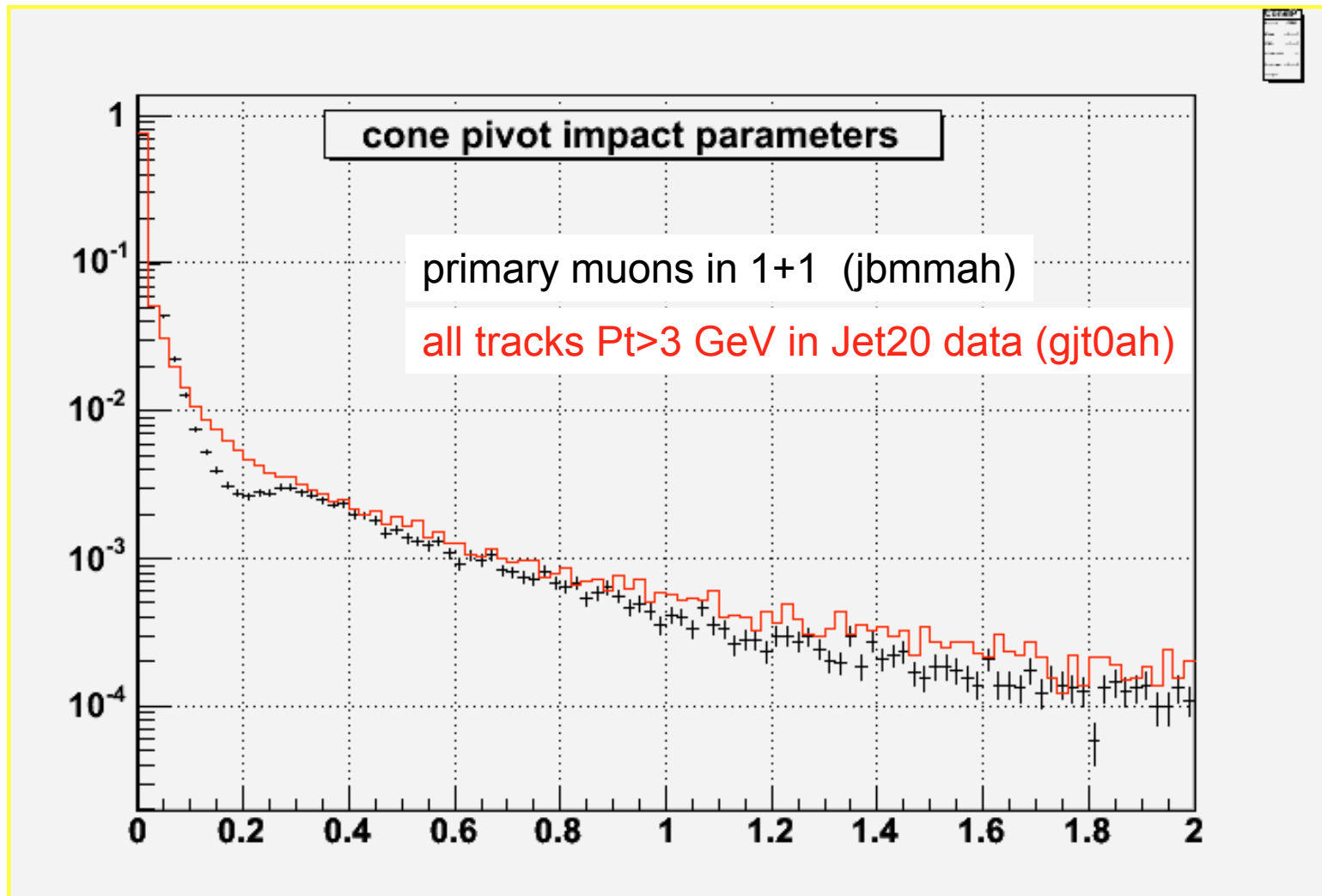
Impact parameter tails

- Is this a signal of new physics or a feature created by our tracking system (detector + reconstruction code?)
- Is there a contribution from strange particle decay and how large is it?
- Are impact parameter tails present in different data samples other than di-muons?

Impact parameter distribution



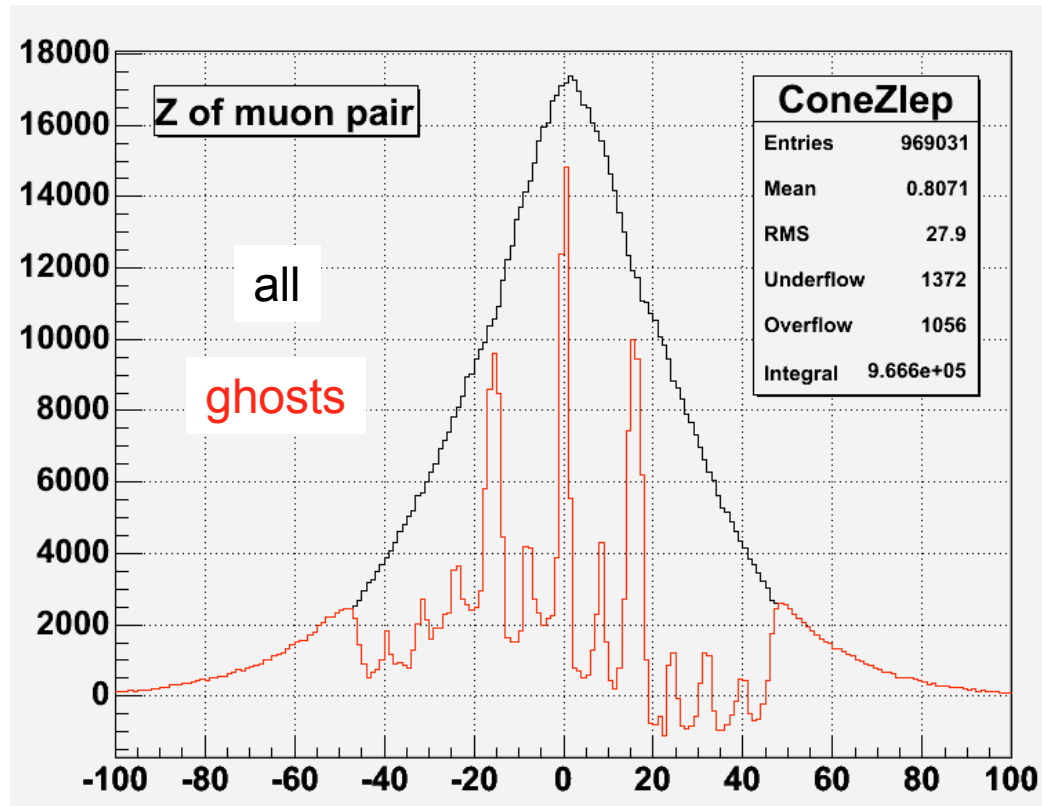
Impact parameter distribution



Impact parameter tails

- Long tails are present in the distribution of the impact parameter of tracks in jet data samples. They are very similar (if not identical) to the tails in the di-muon sample
- They are also present in MC data
- The impact parameter distribution of the primary muons is also very similar with the exception of a dip of about a factor of two in the region around ~ 2 mm
- The presence of this kind of tails cannot be considered by itself as evidence for new physics. A quantitative analysis must take into account sources as misreconstructed tracks, secondary interactions and strange particle decays

z of primary vertex in di-muon events



$$\text{ghost} = \sim \text{all} - 4 \times (\text{tight SVX component})$$

z of primary vertex

- many muon pairs fail the tight silicon requirements due to the z position of the primary vertex and detector geometry
- there are good z's and bad z's
- if the primary vertex happens at a bad z, then the primary muons have a high probability of missing the tight silicon cuts
- the same must happen for any additional muon and for all tracks originating from the same collision
- this creates a correlation between tracks in the same event: if the primary muons fail the tight silicon requirement, then any additional muon will have a higher probability of failing
- maybe one should investigate in MC data if the lack of silicon hits on a track might influence the appearance of a fake tail in the impact parameter distribution due to misreconstruction